

SCIENCE

GALLERY

05.10.2019 – 11.10.2019

ELEMENTS

ಧಾತುಗಳು

Image courtesy of the European Southern Observatory



Photograph courtesy of Nick Nice.

*Please note that the images used throughout the catalogue are the copyright of photographer or Science Gallery Bengaluru and are not available under Creative Commons license unless otherwise specified.

TABLE OF CONTENTS

4

ABOUT
ELEMENTS

8

ELEMENTS
OVERVIEW

10

EXHIBITS

44

PROGRAMMES

82

MEDIATORS

84

COLLABORATORS

86

TEAM

ABOUT ELEMENTS



We have long been aware that our world is not just made up of matter but rather of particular types of matter. Elements have properties, characteristics and even character. They have been shaped, traded, exploded, created, destroyed and even feared. In the pursuit to understand them, many attempts have been made to tame the elements, the most successful of them being The Periodic Table.

The Periodic Table of Elements captures the essence not only of chemistry, but among others, also of physics, medicine, earth sciences and biology. Today, we largely follow the map of periodicity as developed by Dmitri Mendeleev in 1869. Mendeleev built his table upon several previous attempts. The table itself is always evolving and changing in both content and form. The current periodic table has 118 elements (Mendeleev's had 63), and we are still looking for more. We are excited about finding new elements, and in the meanwhile, our lifestyle has already created the risk of losing elements we know.

On October 05, 2019, we opened our first pop-up exhibition on the periodic table, ELEMENTS, to the public. Through this exhibition, we participated in the International Year of the Periodic Table of Chemical Elements as observed by the United Nations General Assembly and UNESCO.

ELEMENTS hosted eight exhibits and seven programmes at the Rangoli Metro Art Centre. We saw the participation of 2,200 visitors across age groups, who engaged with the iconic periodic table and elements that constitute it. From quizzes, film screenings, to musical performances and experiments, we brought together chefs, scientists, historians and filmmakers to explore the stuff that matters.

5



B

Boron

1

6

C

Carbon

1

7

N

Nitrogen



13

Al

Aluminium

26

14

Si

Silicon



28.085

15

P

Phosphorus



30.974

31

Ga

Gallium

69

32

Ge

Germanium

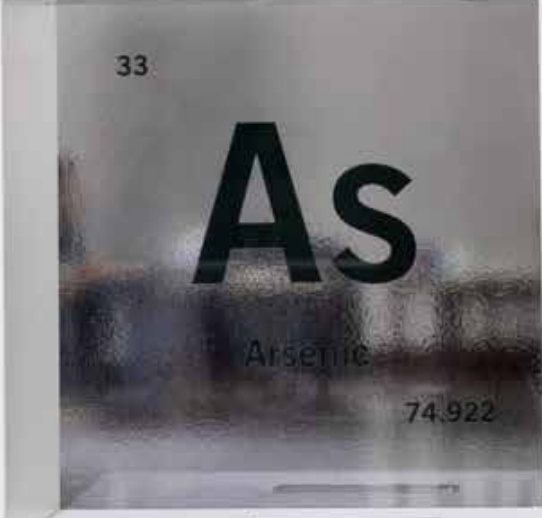


72.630

33

As

Arsenic



74.922

49

In

Indium

114

50

Sn

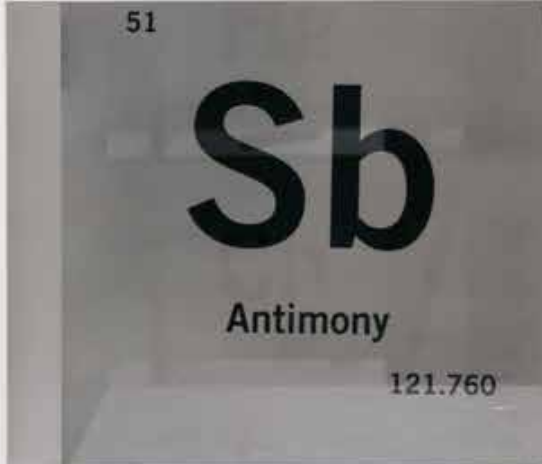
Tin



51

Sb

Antimony



121.760

8

O

Oxygen



9

F

Fluorine



Ne

Neon

20.180

16

S



17

Cl

Chlorine



Ar

Argon

39.948

34

Se

Selenium

78.971

35

Br

Bromine

79.904

Kr

Krypton

83.798

52

Te

Tellurium

127.60

53

I

Iodine

26.904

Xe

Xenon

ELEMENTS 2019 / 7
131.293

Photograph of Bring Your Own Element, 2019.

ELEMENTS OVERVIEW

EXHIBITS

8 Exhibits
4 Institutions
45 Minutes
Average Time Spent
At the Exhibition

PROGRAMMES

9 Facilitators
9 Institutions
500 Participants

7 DAYS 2,200 + VISITORS

“Such exhibitions have made ordinary people very excited to know what science is all about...Science always created this fortress, as if to say, ‘Only if you’re intelligent can you enter the portals of science,’ and it should not be so. Science is for everyone!”

- Kiran Mazumdar-Shaw,
Chairperson of Biocon Ltd.

MEDIATORS

8 Mediators
4 Institutions
6 Languages

MEDIA ENGAGEMENT

1,32,996 Impressions
5,838 Engagements
7 Press mentions

EXHIBITS



Bring Your Own
Element

Through the
Looking Glass



Tale of the Table

Tableau

Testing
Table





Science
Culture
Experiment

Scripting the
Table

Reading Nook

Photograph courtesy of Franco Antonio Giovanella.

Bringing Your Own Element

We invited our visitors to contribute to ELEMENTS by bringing their own objects to the crowd-sourced periodic table of elements. These objects were placed on individual shelves dedicated to each element, which replicated a life-size periodic table. *Bring Your Own Element* was inspired by the ELEMENTS exhibition organised at Science Gallery Dublin in 2011.

“It was cool to see how one could bring objects from their own home and contribute to the exhibit by building on it.”

- Hardik Chandrahas, Visitor



Visitors interact with *Bring Your Own Element*, 2019.





Visitors interact with *Bring Your Own Element*, 2019.

Th

rough the Looking Glass

Through the Looking Glass displayed elements in their native forms, presented such that the visitor can hold them up close and observe them through a magnifying glass. An interesting fact about each element was etched on the wooden box that contained it. This exhibit was procured with support from the Jawaharlal Nehru Centre for Advanced Scientific Research.

"You know your efforts have borne fruit when you see the excitement in the eyes of everyone -- from kids to grownups, as they explored each element in its pure form through the looking glass"

- Divya Chalapathi, Contributor

ABOUT THE JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH

Jawaharlal Nehru Centre for Advanced Scientific Research is a multidisciplinary research institute situated in Jakkur. Their mandate is to pursue and promote world-class research and training at the frontiers of Science and Engineering covering broad areas ranging from Materials to Genetics.

63 151.96

Eu

Europium



150.36
Sm
Samarium

...ma a compound with
... powerful permanent
... the highest resistance
... ation of any known
... aterial.

64 157.25
Gd
Gadolinium

Gadolinium is
... interestingly
... ferromagnetism
... temperature which
... used as a magnetic
... can sense ha

244
Pu
Plutonium



95 243
Am
Americium



96 247
Cm
Curium

34 78.96

Se

Selenium



35 79.90

Br

Bromine

This liquid element has such a bad
smell that its name means 'Stinky'
in Greek and the only reason people
made it was to make a dye known
as 'Tyrian Purple' which was so
expensive that only royalty could
afford it.

36 83.80

Kr

Krypton

For a long time the 'meter' (3.28
feet) was officially defined by the
wavelength of krypton-86, the
heaviest stable isotope of krypton

52 127.60

Te

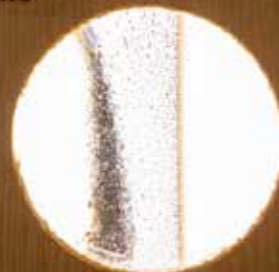
Tellurium



53 126.91

I

Iodine



54 131.29

Xe

Xenon

...stographic flash lamps, high
...ensity arc-lamp for motion
...ure projection, lamps used f
...-sea observation, bactericid
...s, sunbed lamps all have xen
...em and gives a soft blue glo

Photograph of Through the Looking Glass, 2019.

ABOUT THE SCIENTIST

N.S. Vidhyadhiraja is a physicist, focusing on condensed matter theory. He is a professor at the theoretical sciences unit, and the Dean, fellowships and extensions at JNCASR. He has held visiting positions at Motorola India, University of Cincinnati, Birck Nanotechnology Centre, Purdue University and the Louisiana State University, where he is also an adjunct faculty member at the physics department. His research is focused on the development and application of quantum many body methods to understand strongly correlated electron systems.

ABOUT THE RESEARCHER

Divya Chalapathi is a PhD student working in the Chemistry and Physics of Materials Unit, Jawaharlal Nehru Centre for Advanced Scientific Research. She is pursuing her research in the field of Raman spectroscopy and its applications in diagnostics. She received her Integrated M.Sc degree in Physical Sciences from University of Hyderabad, in 2015. She attempts to use art and simple innovative ideas to make science interesting for school students, through various outreach activities.



Visitors interact with *Through the Looking Glass*, 2019.





Visitors interact with *Through the Looking Glass*, 2019.

Tale of the Table

Tale of the Table consisted of a display of periodic tables from the 1700s up to the present day, designed by physicists, chemists and other scientists. From Dalton's table of elements, to modern day 3D representation, this exhibit shed light on the various attempts to categorise and classify elements. It also showcased the predictions for future discoveries of elements. The images showcased in the exhibit were procured with the support of the Science History Institute.

“It was very interesting to learn about the history of the periodic table.”

- Visitor

ABOUT THE SCIENCE HISTORY INSTITUTE

The Science History Institute collects and shares the stories of innovators and of discoveries that shape our lives. They preserve and interpret the history of chemistry, chemical engineering, and the life sciences.

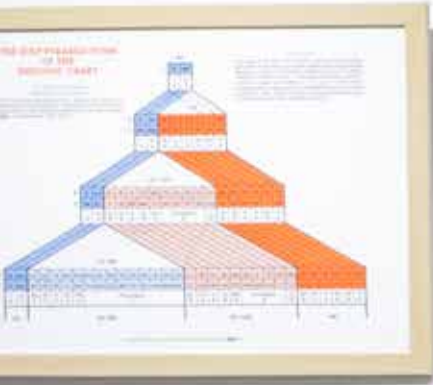


Table of Chemical Elements

This table lists the chemical elements, their symbols, and atomic numbers. It is organized into groups and periods, with a legend for the different types of elements: metals, non-metals, and metalloids.

| Group | Period | Element | Symbol | Atomic Number |
|-------|--------|-----------|--------|---------------|
| 1 | 1 | Hydrogen | H | 1 |
| 1 | 2 | Lithium | Li | 3 |
| 1 | 3 | Sodium | Na | 11 |
| 1 | 4 | Potassium | K | 19 |
| 1 | 5 | Rubidium | Rb | 37 |
| 1 | 6 | Cesium | Cs | 55 |
| 1 | 7 | Francium | Fr | 87 |
| 2 | 2 | Helium | He | 2 |
| 2 | 3 | Neon | Ne | 10 |
| 2 | 4 | Argon | Ar | 18 |
| 2 | 5 | Krypton | Kr | 36 |
| 2 | 6 | Xenon | Xe | 54 |
| 2 | 7 | Radon | Rn | 86 |





Visitors interact with Tale of the Table, 2019.



Tableau was an interactive experience developed by the Royal Society of Chemistry that allowed visitors to explore the various facets of the periodic table using an app. It featured history, alchemy, podcasts, video and data trends across the periodic table.

“It was so fascinating to see how you can bring a periodic table to life through an app!”

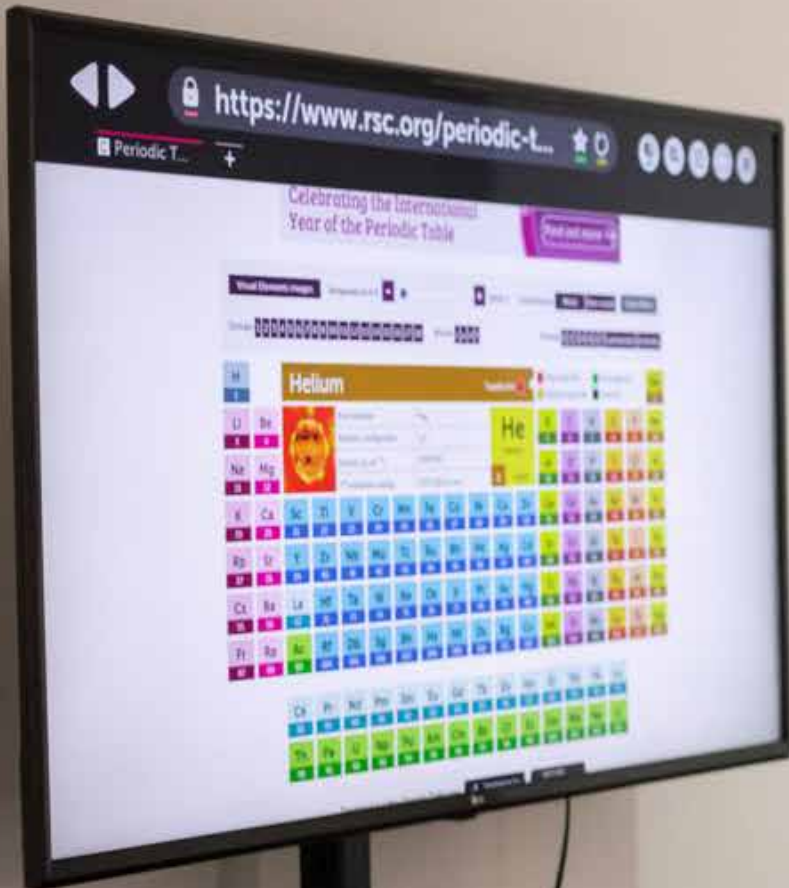
- Visitor

ABOUT THE ROYAL SOCIETY OF CHEMISTRY

The Royal Society of Chemistry works to shape the future of the chemical sciences for the benefit of science and humanity. With over 50,000 members and a knowledge business that spans the globe, they are the UK's professional body for chemical scientists; supporting and representing members and bringing together scientists from all over the world. As a not-for-profit organisation with more than 175 years of heritage and an ambitious international vision for the future, they promote, support and celebrate chemistry.



Visitor interacts with Tableau, 2019.



ಧಾತುಗಳು ELEMENTS



A mediator shows visitors Tableau, 2019.

Te sting Table

The *Testing Table* was a place for visitors to experience the joy and messiness involved in the discovery of elements. Led by the mediators, the visitors performed various experiments of increasing complexity to unearth the properties of various elements.

From splitting water through electrolysis to tracking invisible gases through experiments, this setup helped the visitor understand how elements and compounds are all around us. This exhibit was procured with the support of Rajendra S Rane and the Royal Society of Chemistry.

“The interactive component in this exhibit is very useful because the mediator takes you through the elements by demonstrating different experiments.”

- James, Visitor

ABOUT THE CONTRIBUTOR

Rajendra S Rane, after his post-graduation in Biotechnology, started his career as a R&D Scientist with AstraZeneca, where he did research and technology development for 22 years in the fields of Molecular Biology, Biochemistry, and Automation. He founded Experimentum Learning in 2016 and has conducted hundreds of hands-on experimental Science Workshops for high school students in Bangalore. He has also been worked with Royal Society of Chemistry as a teacher mentor in 5 Salters Chemistry Camps in Karnataka.



Visitors experiment with Testing Table, 2019.

FUTURE?

Rytko's Model for predicting new ELEMENTS





Mediators demonstrating experiments to visitors at the Testing Table, 2019.

Sc ripting the Table

Scripting the Table was created as a part of the Letterform/Counterform Project from Professor David Mazure's Design Course at East Stroudsburg, University of Pennsylvania. In this version of the Periodic Table, each letter that denotes a particular element was rearranged, juxtaposed and/or cropped in an interesting way. The resulting installation was an innovation of the iconic table that researchers and students know and love.

“You can teach young people everything about the world through the periodic table.”

- Visitor

ABOUT THE RESEARCHER

David Mazure is a professor of Art + Design at East Stroudsburg, University of Pennsylvania. He combines creative digital media with an analog foundation in two-dimensional graphic design and fine art classes. Currently, his creative activity is focused on Design for Good: art and design projects that involve the whole community.



Photograph of David Mazure's *Scripting the Table*, 2019.





Visitors interact with *Scripting the Table*, 2019.



SCIENCE CULTURE EXPERIMENT

Neon has lived the life of a legend. An inert unreactive gas, discovered in 1898 by British scientists William Ramsay and Morris Travers when they observed a brilliant red glow in Geissler tubes. (Incidentally, Ramsay advised the Indian Government in 1902 on the setting up of a scientific institute in India, whose founding director was Morris Travers—the Indian Institute of Science, Bengaluru.) Travers wrote, "the blaze of crimson light from the tube told its own story and was a sight to dwell upon and never forget."

The noble gas went on to become an iconic symbol representing an entire era in history. What comes to mind when you think of Las Vegas? In the present world, the element is past its prime, lost in the brightness of cheaper LEDs.

We displayed a neon sign depicting the chemical symbols for Scandium, Copper and Xenon which also represent Science, Culture and Experiment to remind people that the story of science is becoming a part of culture—it all starts with an experiment.

Reading Nook

The *Reading Nook* was an informal space for reading and discussions that contained a curated reading list of books covering the social, political, chemical, and physical nature of the periodic table from Primo Levi's *Periodic Table* to Sam Kean's *Disappearing Spoon*.



“The books in the reading corner were very well curated...it contained a range of texts from academic textbooks to comic books.”

- Visitor



Visitors reading at the Reading Nook, 2019.

Elements.

Gray, Theodore. (2009)
Black Dog & Leventhal

**Metal Men:
Full Metal Jacket.**

Rouleau, Duncan. (2008)
DC Comics

**The Element in the Room:
Investigating the Atomic
Ingredients that Make Up
Your Home**

Barfield, Mike. (2018)
Laurence King

**Stuff Matters:
Exploring the Marvellous
materials that shape our man
made world.**

Miodownik, Mark. (2014)
Houghton Mifflin Harcourt

**Molecules of Murder:
Criminal Molecules
and Classic Cases.**

Emsley, John. (2008)
Springer-Verlag

**Napoleon's Buttons:
How 17 Molecules
Changed History.**

LeCouteur, Penny and
Burreson, Jay. (2003)
Tarcher

Periodic Tales.

Aldersey-Williams, Hugh.
(2011)
Viking

The Periodic Table.

Levi, Primo. (2000)

UK, Penguin

**Uncle Tungsten:
Memories of a
Chemical Boyhood.**

Sacks, Oliver. (2001)

London, Vintage

**The Disappearing Spoon:
And Other True Tales of
Madness, Love, and the
History of the World from the
Periodic Table of the Elements.**

Kean, Sam. (2010)

Little, Brown
and Company

**Wonderful Life with the
Elements: The Periodic
Table Personified.**

Yorifuji, Bunpei. (2012)

No Starch Press

The Atom: A Visual Tour.

Challoner, Jack. (2018)

MIT Press

PROGRAMMES



Elements
in the City

94
Elements

Turning
the Table
Upside Down

Elementary,
My Dear
Bengaluru

Groove
Lab



Edible
Elements

Art
Session

Exploring the
Elements

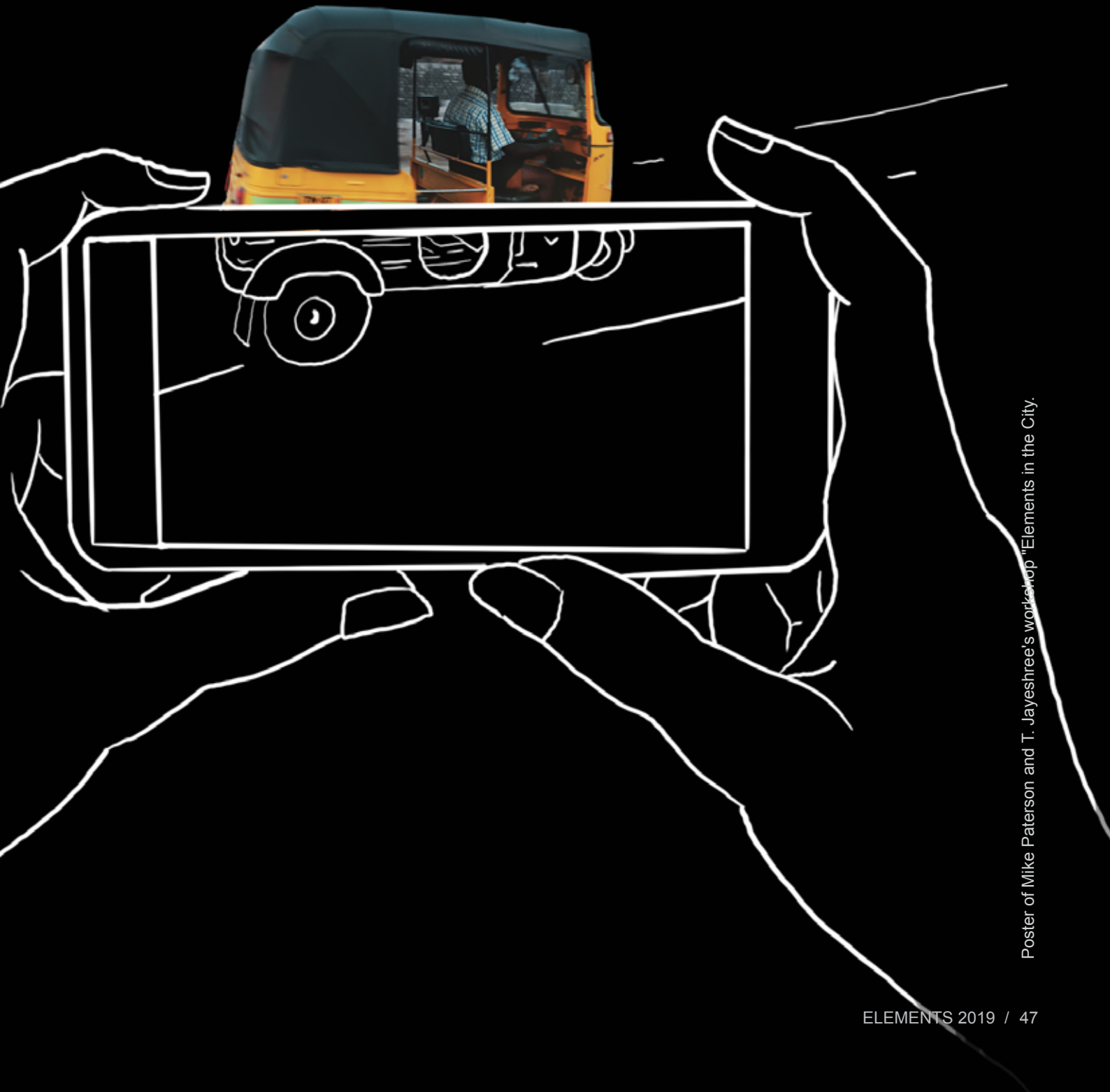
Photograph courtesy of Jason D.

Elements in the City

28 September 2019 | Workshop

The workshop was aimed at exploring the process of making short films and the participants made films about the various ways in which we interact with elements in our city. These films were screened on the closing day of the exhibition.

The workshop was initiated by Mike Paterson and led by T. Jayashree.



Poster of Mike Paterson and T. Jayeshree's workshop "Elements in the City."

ABOUT THE FILMMAKERS

Mike Paterson, the director of the *94 Elements* project. He has a background in film and broadcast fiction production before leaving TV to work as a teacher and journalist. Returning to documentary production, he established PFILM to explore new opportunities for documentaries on the web and across different platforms. His previous project, *Colliding Particles*, follows a team of physicists hunting for the Higgs particle at the Large Hadron Collider at CERN in Switzerland. Mike is based in London in the UK.

T. Jayashree has written, produced and edited documentary, television and radio programmes on issues including women's empowerment, rural development, health, ethnic violence and prostitution. Some of her films include *A Human Question* (2006), *Many People Many Desires* (2004). She has also worked on a number of other productions, such as *New Americans* (2003) on which she was Associate Producer for PBS, *Agni Varsha* (2002) for which she wrote the screenplay and served as first Assistant Director, *A Woman's Place* (1998) which she produced for PBS and *Annapurna* (1995) which she co-directed. She is currently based in Bangalore.



Top: Participants at Mike Paterson and T. Jayashree's workshop "Elements in the City."
Bottom: T. Jayashree conducts "Elements in the City."

Turning the Table Upside Down

5 October 2019 | Panel Discussion

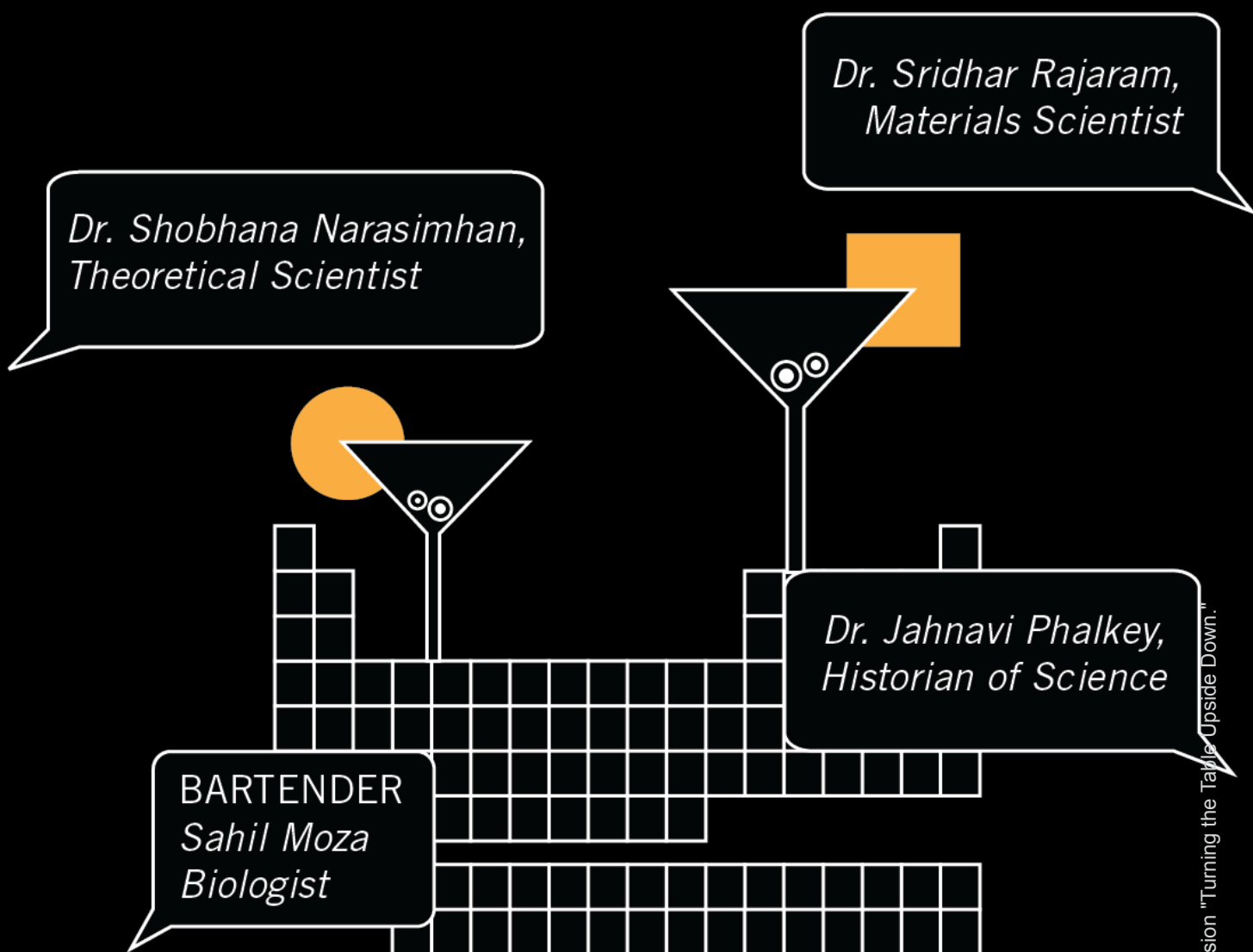
The Periodic Table is immensely important for categorising many different properties of chemical elements, but would turning it on its head (inverting the table) make some important aspects of it easier to understand and give everyone a new perspective on chemistry?

We invited experts from various disciplines to unpack how exploring the table from a new viewpoint would give rise to fresh ideas and how the table has constantly evolved in order to meet new challenges. The discussion was inspired by a study conducted by researchers at The School of Chemistry at the University of Nottingham.

“A student coming to this exhibition may become so excited by the concepts explored here, that he might make new discoveries.”

- Participant

A PHYSICIST, A CHEMIST AND HISTORIAN WALK INTO A BAR....



Poster of the panel discussion "Turning the Table Upside Down."

ABOUT THE PHYSICIST

Shobhana Narasimhan is a Professor of Theoretical Sciences at the Jawaharlal Nehru Centre for Advanced Scientific Research in Bangalore, India. Her main area of interest is computational nanoscience. Her research examines how the lowering of dimensionality and reduction of size affect material properties. She is a Fellow of the National Academy of Sciences, India.

ABOUT THE CHEMIST

Sridhar Rajaram is a Professor at the Jawaharlal Nehru Centre for Advanced Scientific Research. His research interests lie in Organic Chemistry with a focus on developing new materials and new reactions. Rajaram's group has developed novel electron transporters of organic solar cells. They have developed dendritic Raman markers for amplification free detection of viral-RNA. Currently, they are working on developing biodegradable poly carbonates for replacing bis-phenol A based polymers. Apart from this, they are also working on developing novel metal-free catalysts that can be utilized synthesis of polymers.



ABOUT THE HISTORIAN

Jahnvi Phalkey was appointed Founding Director of Science Gallery Bengaluru in November 2018. Previously she was faculty at King's College London. She started her academic career at the University of Heidelberg, following which she was based at Georgia Tech-Lorraine, France, and Imperial College London. Jahnvi is the author of *Atomic State: Big Science in Twentieth Century India* and has co-edited *Science of Giants: China and India in the Twentieth Century*.

ABOUT THE BIOLOGIST

Sahil Moza is a biologist currently completing his Ph.D at Upendra Bhalla's Lab in National Centre for Biological Sciences (NCBS).



Panelists at the panel discussion "Turning the Table Upside Down."





ಭಾರತೀಯ
ELEMENTS

SCIENCE GALLERY

Participants and panelists at the panel discussion "Turning the Table Upside Down."

Elementary, My Dear Bengaluru

6 October 2019 | Quiz

We invited our visitors to channel their inner Sherlock Holmes in a quiz by Bert Ashley about various elements in the periodic table. Ashley is well-known in the city for his “fun work-outable” puzzles in The Hindu Sunday Magazine!

“It was truly an unforgettable experience for me especially as I had a diverse audience with the answers coming in from young adults to senior researchers.”

- Bert Ashley, Quizmaster

Mendeleev

| s | Group I | Group II | Group III |
|------------|----------|----------|-----------|
| H=1 | | | |
| Li=7 | Be=9.1 | B=11 | |
| Na=23 | Mg=24.4 | Al=27 | |
| K=39.1 | Ca=40 | -- =44 | |
| (Cu)=63.3 | Zn=65.4 | -- =68 | |
| Rb=85.4 | Sr=87.5 | Y=89 | |
| (Ag)=107.9 | Cd=112 | In=113.7 | |
| Cs=132.9 | Ba=137 | Ln=138.5 | |
| (-) | - | - | |
| - | - | Yb=173.2 | |
| (Au)=196.7 | Hg=200.4 | Tl=204.1 | |
| - | - | - | |

ev's Periodic Table

| Group IV | Group V | Group VI | Group VII | Group VIII |
|----------|----------|----------|-----------|---|
| C=12 | N=14 | O=16 | F=19 | |
| Si=28 | P=31 | S=32 | Cl=35.5 | |
| Ti=48.1 | V=51.2 | Cr=52.3 | Mn=55 | { Fe=56, Ni=58.5, Co=59.1, Cu=63.3 |
| --=72 | As=75 | Se=79 | Br=80 | |
| Zr=90.7 | Nb=94.2 | Mo=95.9 | --=100 | { Rh=103, Ru=103.8, Pd=106, Ag=107.9 |
| Sn=118 | Sb=120.3 | Te=125.2 | I=126.9 | |
| Ce=141.5 | Di=145 | -- | -- | -- -- -- |
| -- | -- | -- | -- | { Ir=183.1, Pt=194.8, Os=200, Au=196.7 |
| -- | Ta=182.8 | W=184 | -- | |
| Pb=206.9 | Bi=208 | -- | -- | |
| Tl=233.4 | -- | U=239 | -- | -- -- -- |



An image from Bertie Ashley's quiz "Elementary, My Dear Bengaluru."



ABOUT THE QUIZMASTER

Berty Ashley is a Molecular Geneticist at the Dystrophy Annihilation Research Trust. He works with the fundamental molecules of life, DNA and is doing cutting edge research on technology to design, synthesize and validate personalized genetic therapy for children suffering from rare genetic disorders such as Duchenne Muscular Dystrophy. When he is not busy doing his research or writing grants he can be usually seen at a concert or at a quiz. Ashley is an avid lover of music who not only collects vinyl records but also plays with three bands. He listens to everything from Hindustani to heavy metal.



Participants at Berty Ashley's quiz "Elementary, My Dear Bengaluru."

Groove Lab

9 October 2019 | Performance

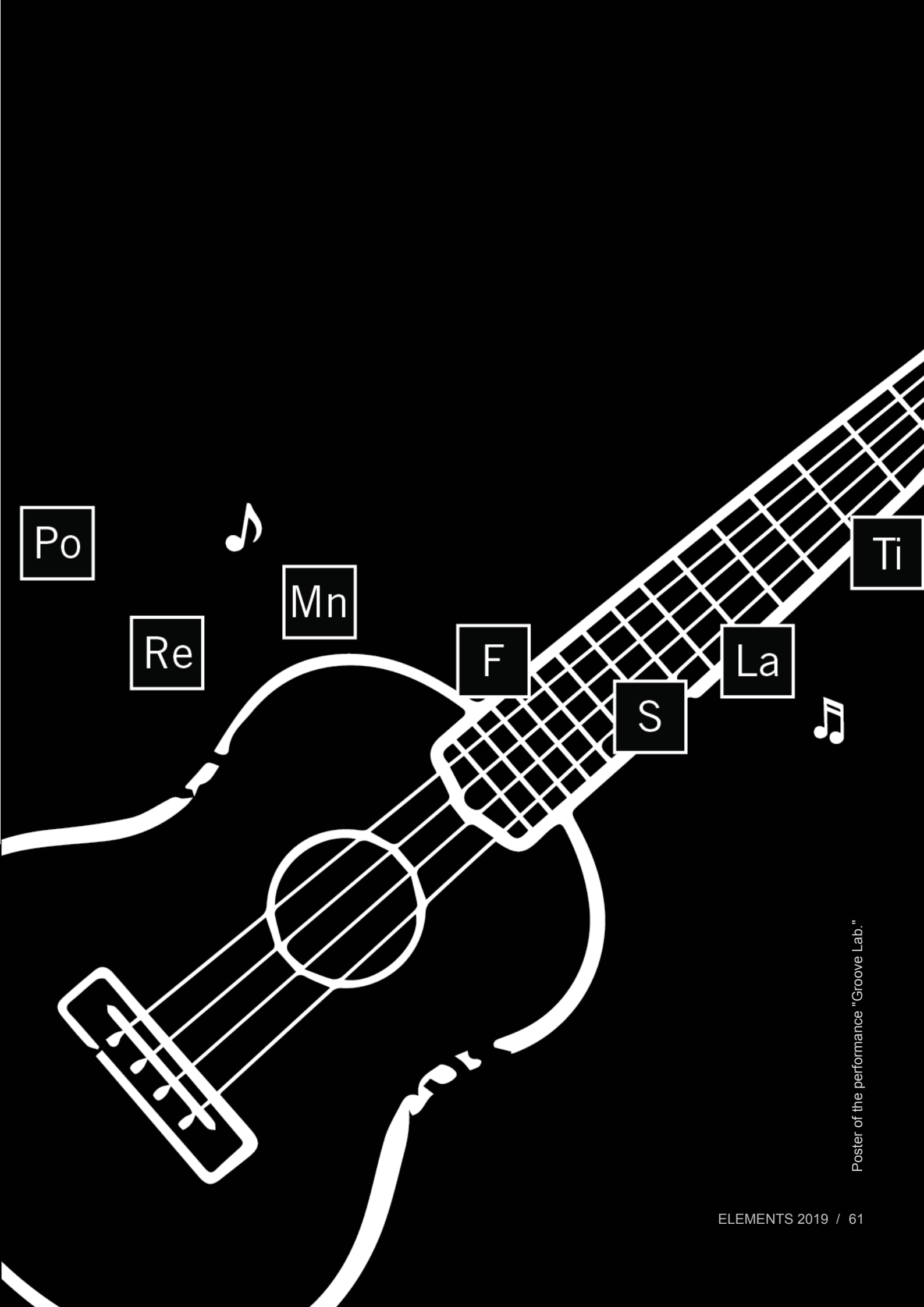
Popular acoustic band Groove BLR took visitors on a musical journey through the periodic table. Songs, stories and laughter resounded through the auditorium as the performers gave an elemental twist to beloved melodies!

“I loved the concert, couldn't help but wish someone had taught us chemistry that way! The mashup of songs and the energy was amazing!”

- Misha Gupta, mediator

ABOUT THE BAND

Groove BLR is an acoustic project comprising Bertie Ashley on Guitars, Rajesh 'RRK' Radhakrishnan on vocals, Jesse Jeffrey on vocals and Swami on percussion. Between them they have an esoteric taste from classic rock to hip hop and Tamil film music. They are known for their energetic upbeat and tight gigs and especially for their sense of humour which is prevalent.



Po

Re

Mn

F

S

La

Ti

Poster of the performance "Groove Lab."





Groove BLR plays at "Groove Lab."

Art Session

6 October 2019 | Workshop

We conducted an art session for community members to create work inspired by the elements. This workshop was conducted in collaboration with the Royal Society of Chemistry.

ABOUT THE ARTIST

Shivaprasad K Achar is an artist who works at Rangu Art Gallery. He is an alumni of the Karnataka Chitrakala Parishad.

ABOUT THE ROYAL SOCIETY OF CHEMISTRY

The Royal Society of Chemistry works to shape the future of the chemical sciences for the benefit of science and humanity. With over 50,000 members and a knowledge business that spans the globe, they are the UK's professional body for chemical scientists; supporting and representing members and bringing together scientists from all over the world. As a not-for-profit organisation with more than 175 years of heritage and an ambitious international vision for the future, they promote, support and celebrate chemistry.



Participant with her painting at the workshop "Art Session."

Edible Elements

9 October 2019 | Workshop

Our “Edible Elements” programme saw visitors from all walks of life participate in a workshop and tasting session to know more about the chemical composition of their favourite food items. Facilitated by Chef Elizabeth Yorke of Edible Issues, this programme allowed visitors to create and taste different combinations of food and engage with elements in their natural forms.

"Food is universal and as a chef, I recognise that food doesn't start or end in the kitchen. This experience created the ability to explore, learn and understand different possibilities and aspects of food, connecting science, culture & systems."

- Elizabeth Yorke, Chef

ABOUT THE CHEF

A chef by training, **Elizabeth Yorke** has travelled widely and worked with food historians, chefs, scientists and artists. She is the co-founder of Edible Issues, a collective that fosters thought and action on the Indian Food System and looks for opportunities to use her culinary skills and knowledge in food systems to create better experiences for both consumers and creators of food.

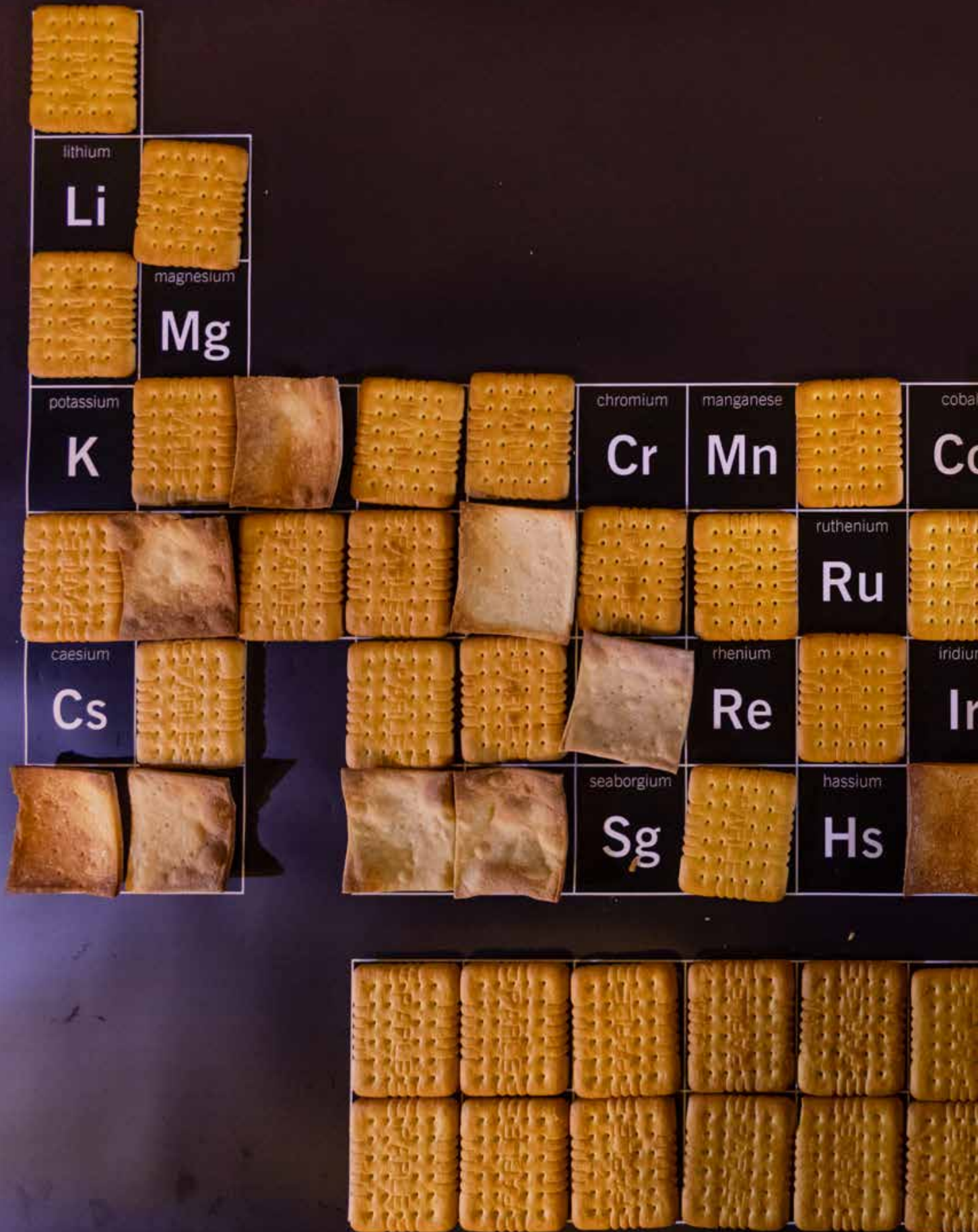


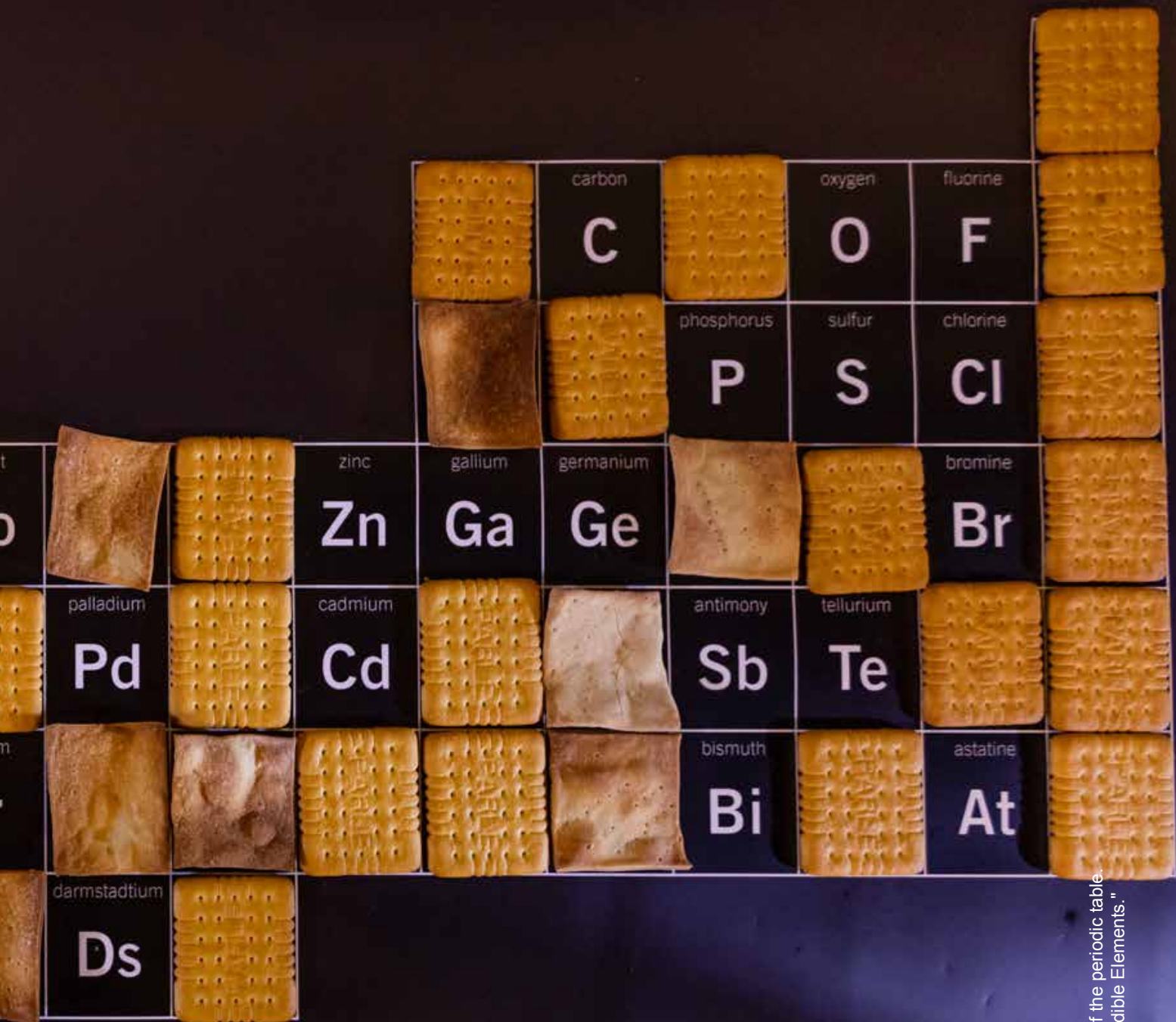
Poster of Elizabeth Yorke's workshop "Edible Elements."





Participants at Elizabeth York's workshop "Edible Elements."





Crackers covering some elements in a display of the periodic table.
Photograph from Elizabeth Yorke's workshop "Edible Elements."

Film Screening

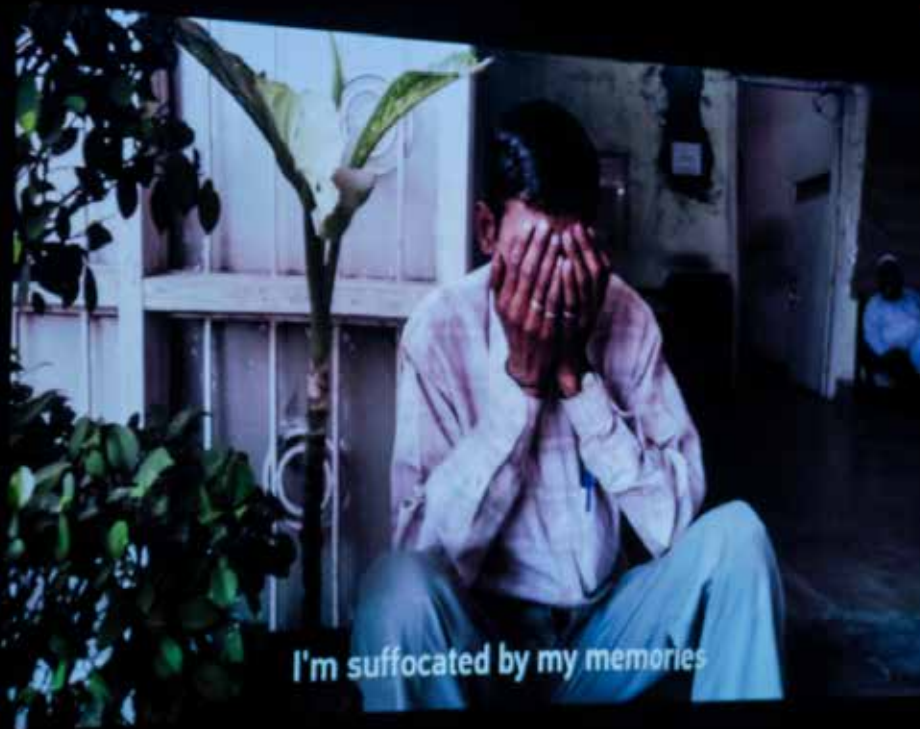
10 October 2019 | Screening

At Rangasthala, we screened some fascinating movies from *94 Elements*, a global filmmaking project. There are 94 naturally occurring elements, and together they make everything in the world. *94 Elements* is a global filmmaking project, featuring a short film for each element by a different filmmaker. The project celebrates the diversity of the documentary form, with films being made by filmmakers and animators all over the world.

ABOUT THE FILMMAKER

Mike Paterson, the director of the *94 Elements* project. He has a background in film and broadcast fiction production before leaving TV to work as a teacher and journalist. Returning to documentary production, he established PFILM to explore new opportunities for documentaries on the web and across different platforms. His previous project, *Colliding Particles*, follows a team of physicists hunting for the Higgs particle at the Large Hadron Collider at CERN in Switzerland. Mike is based in London in the UK.

LITHIUM IS PRESCRIBED TO TREAT BIPOLAR DISORDER. THE PSYCHIATRIC DRUG, LITHIUM CARBONATE, ACTS AS A MOOD STABILIZER FOR PATIENTS EXPERIENCING MANIC DEPRESSION, A CYCLE OF EUPHORIC HIGHS FOLLOWED BY A CRASH OF SEVERE DEPRESSION.



I'm suffocated by my memories

Exploring the Elements

11 October 2019 | Public Lecture

We invited our visitors to take a historical journey with Arnab Bhattacharya from the Tata Institute of Fundamental Research to see how we arrived at the modern day periodic table. It is not just chemistry, but inputs from astronomy to nuclear physics that have, over the years, helped us understand the elements that the universe is made up of. The periodic table is not just a symbol of chemistry but one of the great unifiers of science.

“There were so many new elements that I never knew existed.

Now I am excited to explore the larger world of chemistry.”

- Programme participant

ABOUT THE SCIENTIST

Arnab Bhattacharya is a scientist working in the area of semiconductor optoelectronics at the Tata Institute of Fundamental Research (TIFR) in Mumbai. Bhattacharya has a B.Tech degree from IIT-Bombay, a Ph.D. from the University of Wisconsin-Madison, and worked on an Alexander-von-Humboldt fellowship at the Ferdinand-Braun-Institut in Berlin, before setting up a research group in TIFR for novel semiconductor materials and devices. His work has focused on III-nitride semiconductors, in particular synthesis of materials via metalorganic vapour-phase epitaxy. Bhattacharya is on the editorial board of the Journal of Crystal Growth and a senior member IEEE. Apart from semiconductors, Bhattacharya is passionate about science outreach, and enjoys talking about science and demonstrating science experiments to all audiences, particularly school/college students and teachers.



Arbab Bhattacharya delivers his lecture "Exploring the Elements."

Coloring the Elements and other stories...

Arnab Bhattacharya

Condensed Matter Physics and Materials Science
Science Popularization and Public Outreach
Institute of Fundamental Research, Mumbai

arnab@tifr.res.in

chaiandwhy

@chaiandwhy @tiframab





Participants at Arnab Bhattacharya's lecture "Exploring the Elements."

IUPAC today

The image shows a projected periodic table of elements. The title 'IUPAC today' is at the top. The table includes elements from Hydrogen (1) to Oganesson (118). The layout is standard, with groups and periods clearly marked. The elements are arranged in a grid, with the noble gases (He, Ne, Ar, Kr, Xe, Rn, Og) in the far right column. The lanthanide and actinide series are shown as separate rows at the bottom, connected to the main table by lines.





Participants at Arnab Bhattacharya's lecture "Exploring the Elements."

MEDIATORS



Mediators are integral to Science Gallery Bengaluru's public engagement programme. Selected from our target audience of young adults, they are responsible for driving the experience on the exhibition floor. Mediators engage and provoke visitors into a conversation sparked by our exhibits, events, and learning programmes.

Our mediators belonged to a variety of academic backgrounds and were typically current undergraduate or postgraduate students. They went through multiple training sessions with our team and participating artists and researchers, working on their skills of communication and public engagement.

Aditya Iyer

Akif Khan

Divya Chalapathi

Gauri Gharpure

Manish Jayashekar

Misha Gupta

Nomaan

Vinay Anand



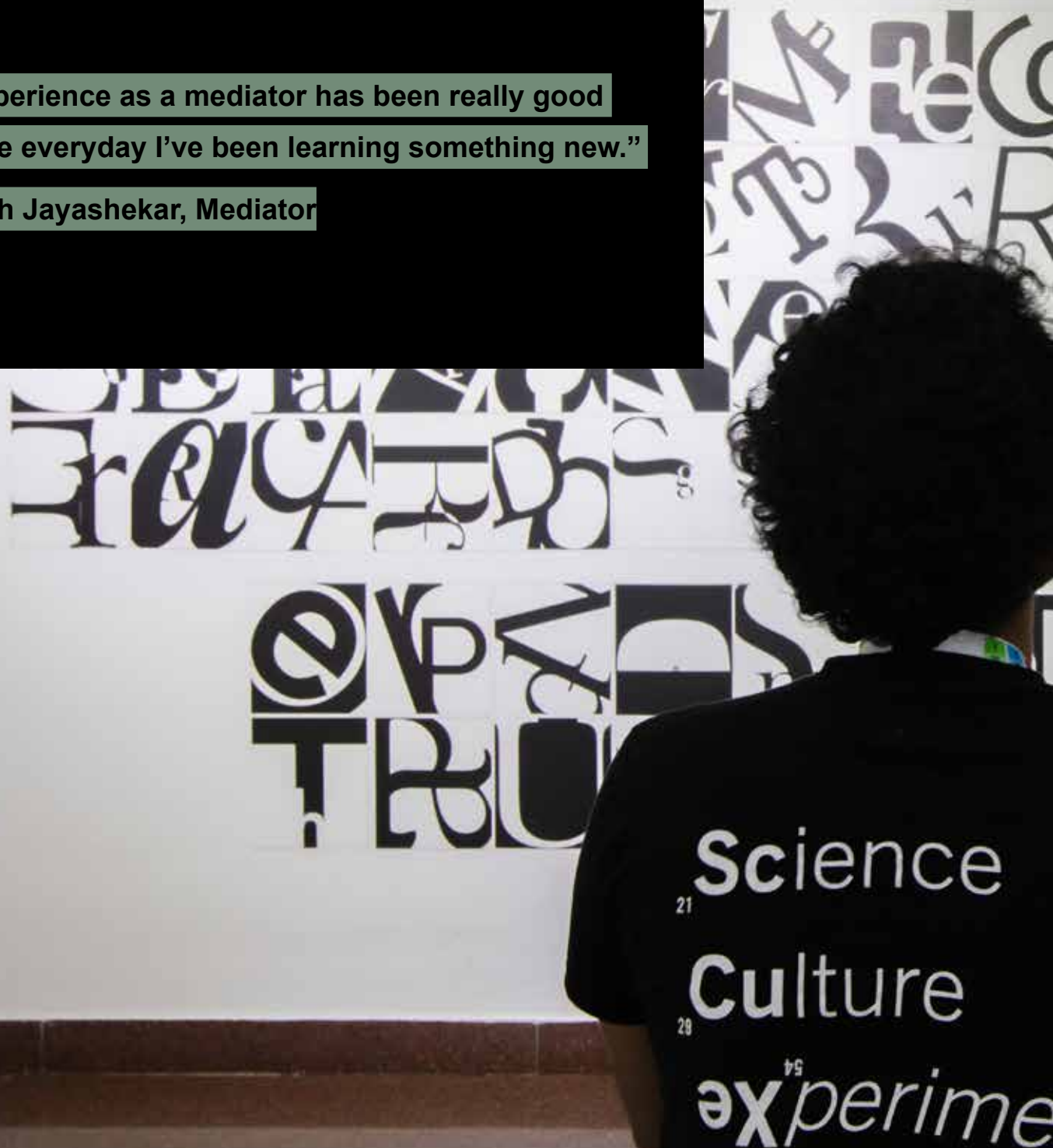
Mediators take visitors through various exhibits.

“I have learnt how to take science outside the elite private institutions to the public masses, and this has been a great learning experience”

- Misha Gupta, Mediator

“My experience as a mediator has been really good because everyday I’ve been learning something new.”

- Manish Jayashekar, Mediator





A mediator at David Mazure's *Scripting the Table*, 2019.

ent

COLLABORATORS

CONTENT PARTNERS



ARTISTS, FILMMAKERS, FACILITATORS AND SPEAKERS

Arnab Bhattacharya
Berty Ashley
David Mazure
Divya Chalapathi
Elizabeth Yorke
Groove BLR
Mike Paterson
N.S. Vidhyadhiraja
Rajendra S Rane
Science History Institute
Shivaprasad K Achar
Shobhana Narasimhan
Sridhar Rajaram
T. Jayashree



Photograph courtesy of Adrien Olichon.

TEAM

CURATORIAL TEAM

Madhushree Kamak
Jahnavi Phalkey

DOCUMENTATION

Whistleman Films

THE SCIENCE GALLERY BENGALURU TEAM

Berty Ashley
Jahnavi Phalkey
Madhushree Kamak
Neha Arora
Shyam Patel





Photograph courtesy of Greg Rosenke.

ELEMENTS

VISIT THE EXHIBITION ARCHIVE AT
www.bengaluru.sciencegallery.com/elements-archive



SCIENCE GALLERY BENGALURU

   @SciGalleryBlr